

SUPPORT FOR THE AMENDMENT

Support for the amendment to claim 1 is found on page 5, lines 18-20 of the specification. Support for claims 14-22 is found in claims 1-5 and 8-13 as originally presented and on page 6, lines 8-10 of the specification. No new matter would be added to this application by entry of this amendment. Upon entry of this amendment claims 1-5 and 9-22 will now be active in this application.

REQUEST FOR RECONSIDERATION

The claimed invention is directed to a polyester resin composition for a toner.

Polyester resins have been used as binder resins for toners. An increased demand for color toners has highlighted some properties of polyester resins which are undesirable. More specifically, color reproducibility combined with durability can be difficult to obtain with some polyester resins. Accordingly, polyester resins suitable for binders in color toners are sought.

The claimed invention addresses this problem by providing for a polyester resin composition in which raw material monomers are condensed in the presence of either a diamino- dialkoxy-substituted titanium catalyst, a tetra- alkenyloxy or acyloxy substituted titanium catalyst or a tetra C₈₋₁₈ alkoxy substituted titanium catalyst and an inorganic phosphorous compound. Applicants have discovered that such a combination of components provides for a polyester resin which gives good performance in a colored toner binder. Such a polyester resin is neither disclosed nor suggested in the cited prior art of record.

The rejections of claims 1-3 and 11-13 under 35 U.S.C. § 103(a) over Barkey (U.S. 5,217,440) and of claims 1-5, 11 and 13 under 35 U.S.C. § 103(a) over Harazoe et al U.S. 5,519,112 in combination with Schiraldi U.S. 5,922,828 and Yamamoto et al. U.S. 5,637,427 are respectfully traversed.

None of the cited prior art of record discloses or suggests the use of a diamino-dialkoxy, alkenyloxy or acyloxy substituted titanium compound nor that by using a C₈₋₁₈ tetrasubstituted alkoxy titanium compound that an improvement in properties for a polyester resin would be observed.

Claims 1-5 and 9-13:

This embodiment of the claimed invention is directed to a polyester in which the catalyst is a diamino- dialkoxy, alkenyloxy or acyloxy substituted titanium compound.

None of the cited references disclose or suggest a polyester in which the catalyst is a diamino- dialkoxy, dialkenyloxy or diacyloxy or a tetra alkenyloxy or acyloxy substituted titanium compound.

Borman et al. describes a catalyst system to provide a polyester which is more compatible with polycarbonate resins. The catalyst system includes a phosphorus component and a titanium component described as follows:

“According to the present invention there is provided a novel polyesterification catalyst system comprising a phosphorus component and a titanium component. Preferably, the catalyst is a complex of a phosphorus compound and a titanium compound in a molar ratio of less than about 3:1, more preferably less than about 2:1. Preferred phosphorus compounds are phosphorous acid, diphenylphosphite, phenylphosphinic acid, dibutyl phosphite, diisopropyl phosphite, diphenyl decyl phosphite, sodium dihydrogen phosphate or mixtures of any of the foregoing. Preferred titanium compounds are tetraisopropyl titanate, tetra-w-ethylhexyl titanate, tetra butyl titanate or mixtures thereof.” (column 2, lines 21-32).

“Preferred titanium compounds comprise alkyl titanium esters, such as are known to those skilled in the art, including tetraisopropyl titanate, tetra-w-ethylhexyl titanate, tetra butyl titanate or mixtures thereof. These compounds are prepared according to methods known to those skilled in the art or are commercially available from a variety of sources.” (column 5, lines 6-11).

There is no suggestion of a catalyst which is a diamino- dialkoxy, dialkenyloxy or diacyloxy or a tetra alkenyloxy or acyloxy substituted titanium compound.

Barkey merely describes us of an organic or inorganic compound as a catalyst as follows:

“Catalysts useful in the method of this invention are generally available in the form of organic or inorganic compounds, e.g. tetraisopropyl titanate, titanium dioxide, zinc acetate, zinc acetyl acetonate, calcium oxide, manganese oxide and the like. The acetates, chlorides, nitrates, sulfates, oxides and alkoxides of metals such as zinc, manganese, tin, titanium, antimony, cobalt and lithium are preferred.” (column 6 lines 54-61).

There is no suggestion of a catalyst which is a diamino- dialkoxy, dialkenyloxy or diacyloxy or a tetra alkenyloxy or acyloxy substituted titanium compound.

Harazoe et al. describes a polycondensation catalyst quite broadly as follows:

“Examples of the catalyst used for the polycondensation are germanium dioxide; germanium alkoxides such as germanium tetraethoxide and germanium tetra-n-butoxide; antimony compounds such as antimony trioxide; titanium alkoxides such as titanium tetrabutoxide. Among those, germanium dioxide is particularly preferred.” (column 5, lines 1-6).

There is no suggestion of a catalyst which is a diamino- dialkoxy, dialkenyloxy or diacyloxy or a tetra alkenyloxy or acyloxy substituted titanium compound.

There simply is no suggestion in the primary references of a catalyst which is a diamino- dialkoxy, dialkenyloxy or diacyloxy or a tetra alkenyloxy or acyloxy substituted titanium compound.

The examiner cites to Schiraldi for motivation to use a diamino- dialkoxy- titanium catalyst as claimed in conjunction with an inorganic phosphorus compound.

Applicants respectfully submit that there is no motivation to use the diamino- dialkoxy- titanium compounds as described by Schiraldi with an inorganic phosphorus compound as claimed for the reasons as follows:

Schiraldi describes a catalyst/stabilizer system comprised of titanium and a stabilizer possessing an irreversible oxidation potential of at least +2.0 volts versus the standard calomel electrode (SCE). (column 3, lines 39-45). As a catalyst stabilizer, a hindered phosphite, such a bis(2,4-di-tert-butylphenyl)-pentaerythritol diphosphite is described (column 3, lines 33-36). There is no suggestion of using phosphorus compounds in general

with the titanium compounds, but rather a specific disclosure of a specific hindered phosphate which provides the necessary irreversible oxidation potential of at least +2.0 volts. Since the titanium compound and the hindered phosphate are used together as a system, there is no motivation to use the titanium compound of Schiraldi in any of the inorganic phosphorus containing systems of Borman et al, Barkey or Harazoe et al. Since there is no motivation to use a titanium compound as claimed with an inorganic phosphorus compound, the claimed invention is not obvious over this combination of references and withdrawal of the rejections under 35 U.S.C. 103(a) is respectfully requested.

Claims 14-22:

This embodiment of the claimed invention is directed to a toner comprising a polyester resin which is the product of condensing monomers in the presence of a titanium alkoxide catalyst and an inorganic phosphorus compound.

The examiner has recognized applicants' evidence of an unexpected improvement in color reproducibility by the use of tetra C₈₋₁₈ alkoxy substituted titanium compounds. As to the examiner's comments that applicants have only demonstrated unexpected results using polyphosphoric acids, applicants note that polyphosphoric acids are described in the specification as a mixture of inorganic phosphoric acids such as orthophosphoric acid, pyrophosphoric acid, metaphosphoric acid, triphosphoric acid, tetrphosphoric acid and phosphorus pentoxide. (pg 6, lines 16-24) Applicants' demonstration using a mixture of phosphoric acid compounds is sufficiently representative to support the claim term "inorganic phosphorus compound." Further, claim 17 is directed to the combination of titanium compound and phosphorus compound as noted in the outstanding official action.

As the cited reference fails to disclose an improved performance in toner applications by preparation of a polyester resin as claimed, the claimed invention is clearly not obvious

from this references and accordingly withdrawal of the rejections under 35 U.S.C. §103(a) are respectfully requested.

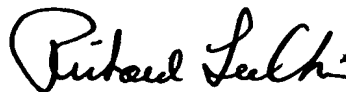
The rejection of claims 1-5 and 9-13 under 35 U.S.C. § 112 first paragraph has been obviated by appropriate amendment.

Claim 1 has been amended to recite a range of the carbon numbers ranging from 8-20, as more clearly articulated on page 5, lines 18-20 of the specification. Withdrawal of this ground of rejection is respectfully requested.

Applicants submit this application is now in condition for allowance and early notification of such action is earnestly solicited.

Respectfully submitted,

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